

DECEMBER 1966/JANUARY 1967

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Gordon Woodroffe



Ben Flitcroft



John Wren-Lewis



Norman McKenna

CONTRIBUTORS

Gordon Woodroffe is a technical officer in the analytical section of Research Department at Heavy Organic Chemicals Division. He joined ICI in 1957 after completing college and National Service commitments. Deeply concerned with the conservation of the remaining wildlife in the world, Mr. Woodroffe is founder and chairman of the Tees-side Group of the World Wildlife Fund.

Ben Flitcroft joined ICI at Wilton in 1960 as a drawtwist operator in the Filament Yarn Plant. On leaving school he worked as an apprentice joiner for four years before signing on for seven years with the Grenadier Guards, in which he rose to the rank of sergeant. After leaving the Army he spent seven years as a constable with the North Riding police force. He is married and has two children.

John Wren-Lewis is a member of Head Office Research and Development Department. On graduating in mathematics from Imperial College, London, in 1944, he joined a research team associated with ICI doing special wartime research and has been with the Company ever since. A rare combination of scientist and theologian, he has become well known as a writer and broadcaster.

Norman McKenna was appointed Managing Director of ICI's new Swedish company, Svenska ICI, in 1963. He joined ICI in 1944 and worked for ten years in the Sales Control Department of the then General Chemicals Division and for one year with the European Council. In 1945 he was a member of a Chatham House Study Group set up to consider India's food problem.

FRONT COVER

The 'Vymura' design group work out colour separations for a new design, using sheets of coloured tissue paper. Before a design is considered for the collection it goes through a number of processes which involve screen printing, colour separation, camera and photographic experimentation. This more often than not involves team work, especially with freelance and external studio designs. *Photograph: Michael Taylor.*



A 'Vymura'
design begins...

VYMURA in the making



"Design ideas stem from many sources," says Robin Gregson Brown (left), "because it is part of a designer's instinct and training to delve into the unusual or what has been unnoticed by the layman. Here for example I am interested in the texture and movement seen in this rusty oil drum lid. The idea is not simply to copy but to interpret and enlarge upon the original form. This can be done in many ways including the use of photography. Very often the final image used is far removed from its origin." Flower designs are perennial favourites. The greenhouse on the Hyde site (previous page) is a popular spot for sketching. Rosemary Young, the girl in our picture, is a design student at the Royal College of Art. She recently spent two months working in the studio at Hyde to gain industrial experience. Many 'Vymura' patterns are the work of the design team at Hyde. Others are adaptations of designs bought from freelance artists both in this country and on the Continent. Susan Faulkner, a member of the team who has several designs in the new 'Vymura' collection, works on an enlargement from a smaller original. Final colourings for a particular pattern are not always those envisaged by the designer. Concessions have to be made both to the popular taste and to the balance of the collection.

Since 'Vymura' first appeared in 1963 it has built up a still-growing reputation both for quality and design. This tough paper-backed vinyl wallcovering comes in luxury designs and textures and also has the unique advantage over any ordinary wallpaper that you can scrub it clean as often as you like. It also resists almost every stain.

A new 'Vymura' collection appears in January. ICI (Hyde) have been busy over the past weeks showing it to the press, to architects and to decorators; its warm reception suggests a success at least equal to that of the earlier collection. Demand then exceeded the most optimistic market forecasts and production capacity has since been considerably increased to ensure good service to customers. 'Vymura' is now being exported to some 20 countries.

The new range has 39 designs, each available in various colour combinations. They vary in mood from romantic neo-Victorian to stark geometric modern patterns and were inspired by such varied sources as wall paintings in an Ancient Egyptian tomb, Spanish tiles and the "Gonks" craze.

A few designs in each 'Vymura' collection are bought from freelance artists and independent studios both in this country and on the Continent. This deliberate policy helps to stimulate the resident design team. But most are either the original work of members of the Hyde Design Studio or traditional patterns and textures specially adapted. Head of the design team is 30-year-old Robin Gregson Brown. He joined ICI from the Royal College of Art in 1960 and made his name in design circles with the first-ever 'Vymura' designs—for the contract-trade only—in 1963 and the more recent retail collection.





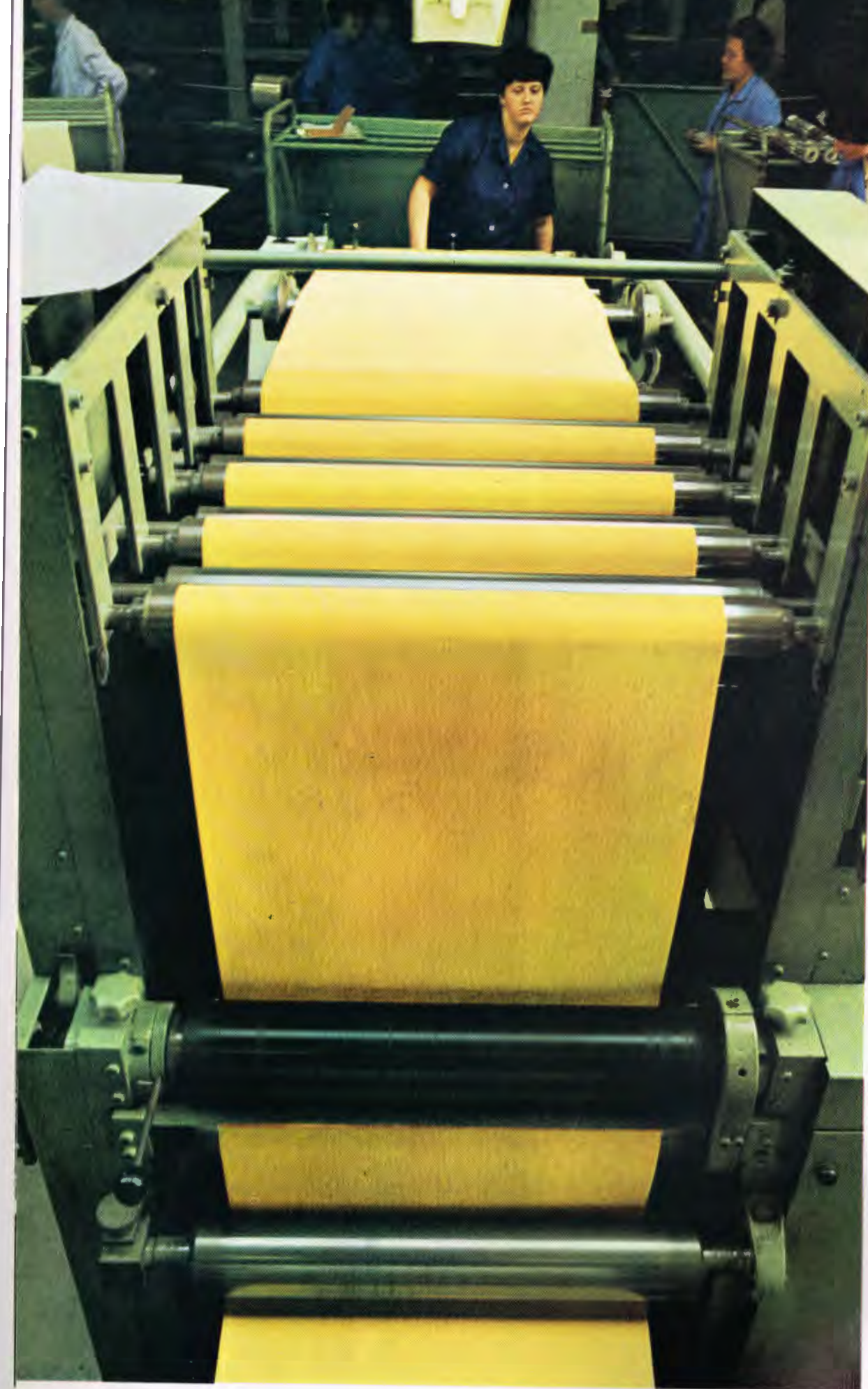
Left: As much time and thought goes into the choice of alternative colourways for a design, as into the design itself. Here a possible colour scheme for a design is screen-printed by hand by colourist Terry Sparkes. Often he has to make as many as three dozen screen prints to reach a satisfactory colouring. A screen print also enables design faults to be ironed out before the patterns are engraved on chrome-finished copper rollers. Correction at the roller stage is both time-consuming and expensive.

Below, left: Once designs have been selected the next step is to plan and progress them through to the trial production run in the factory. This usually takes some months and the engraving of the rollers is contracted out to specialist firms, including companies in North Wales, in Yorkshire and in Germany. A progress group, drawn from the production, design, research, development and sales departments, meets regularly to thrash out problems. Such conferences ensure that the designers are aware of production limitations and that production people realise new techniques must be tried if ICI is to keep its lead.

Below: 'Corvic' pvc polymer from Plastics Division is the main raw material. It is made at Hillhouse and delivered to Hyde by road.

Right: Pigments, including some from Dye-stuffs Division and from British Titan Products, an associated company of ICI, colour the pvc base film. Individual pigments are mixed with plasticiser and put through a grinding process which breaks them down into fine particles. These primary dispersions are blended together to the required base shade before being added to the main pvc film mixture. Blender Dennis Shaw is seen here taking a sample from the colour blend.





Left: Quality control is important at all stages of 'Vymura' production and particularly so during embossing. The smallest variation in temperature or pressure can seriously affect the evenness of the surface texture being applied. To check this, small pieces of 'Vymura' are cut from different positions in the web during an embossing run. Ron Thompson, Plant Manager (left) and Jim Brett, Assistant Manager, are seen examining some samples.

'Vymura' is sold in the shops in the standard wallpaper width of 21 in. but is actually produced double this size for speed and economy. The printed and embossed material has therefore to go through two further machines. First on a slitter the 44 in. wide material is slit in two and the outside edges trimmed. Then in the reeling room (below) it is chopped into 11 yd. long rolls. Each machine can produce 150 rolls an hour. Girls minding the machines, like Ann Heathcote (far left), also make a final inspection for flaws. Every yard of material is checked and all faulty material removed. Rolls are sealed in a polythene wrapping to ensure that they reach the shops in perfect condition.

PHOTOGRAPHS: MICHAEL TAYLOR



BASLE: this male Great Indian Rhino was brought in 1951 from Kaziranga Game Reserve in Assam. He has sired four calves at Basle.

COPENHAGEN: one of a pair of African cheetahs, among the rare animals threatened with extinction. The World Wildlife Fund is supporting a project to investigate its decline.

FRANKFURT: one of four okapis. This rare animal, from the Congo, was only discovered in 1900. Frankfurt have reared three calves.

FRANKFURT: Shoebill storks, an oddity of the papyrus swamps of the Upper Nile, in the zoo's magnificent Bird Hall.



Rendezvous with a Rhino

A chemist with Heavy Organic Chemicals Division at Billingham, Gordon Woodroffe is deeply interested in wild-life conservation. Founder and current chairman of Tees-side's World Wildlife Fund group, he thinks that zoos offer one of the few hopes left to the increasing number of animals under threat of extinction. He describes his highly original holiday this summer touring some of Europe's most famous zoos.

Today, at least 1000 species of animals are threatened with extinction and I believe that the conservation of wildlife is vitally important to the long-term future of man. Zoos have an important role to play in halting this assault by civilization. Scientific methods and long-term research into correct feeding have made it possible to keep almost every type of animal in captivity and to breed it over generations.

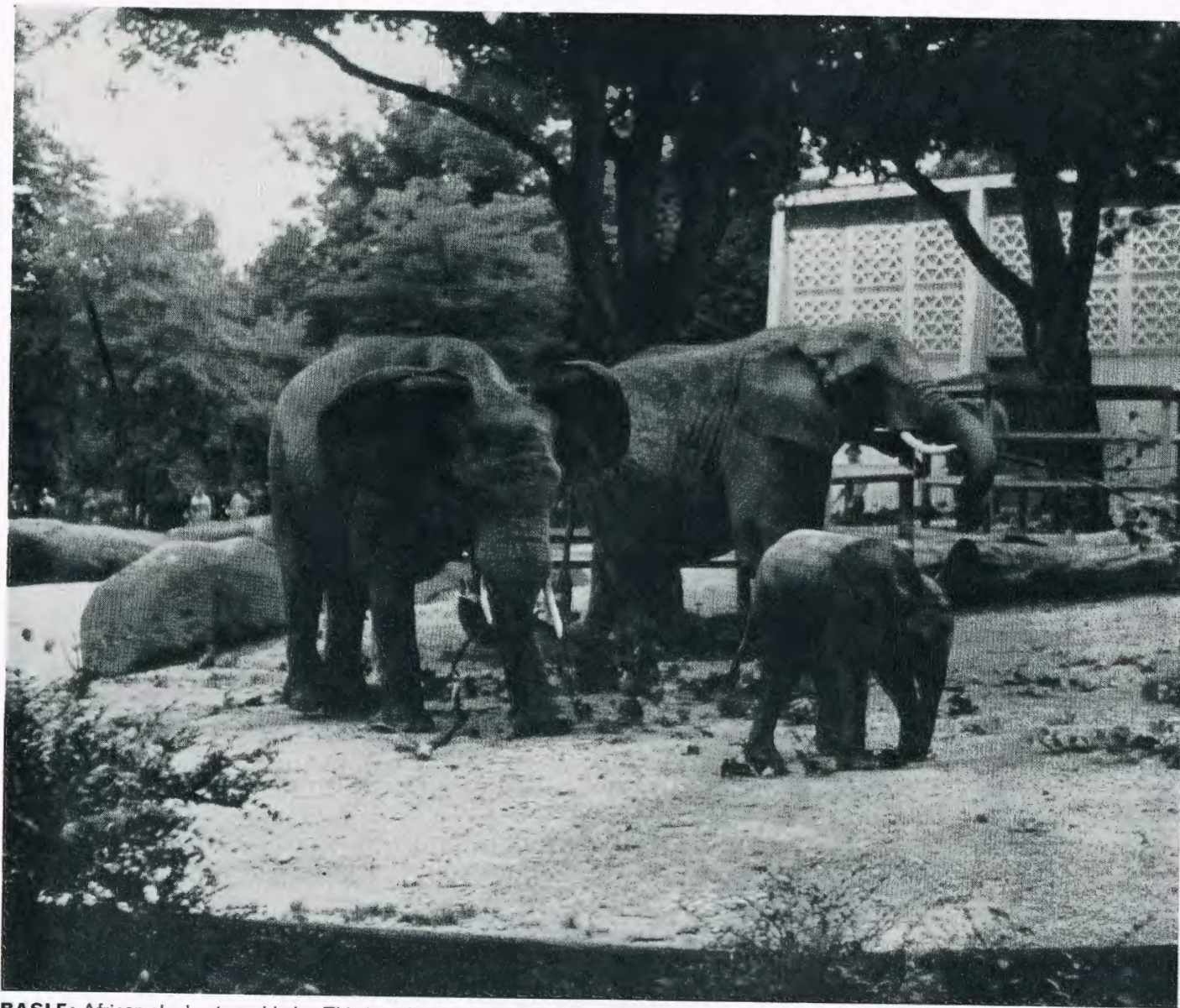
Our tour began at Copenhagen. Our goal here was to see 'Subur', the only specimen in captivity of the world's rarest mammal, the Sumatran rhinoceros. 'Subur', a female rhino, is the sole survivor from an expedition financed jointly by the Basle and Copenhagen zoos to catch pairs of these animals for breeding. Of four animals caught after months of effort, the only male escaped and one of the females

was killed by the natives for its horn. All five species of rhino are being poached out of existence because of the high prices paid for rhino horn in the East, where it is thought to possess aphrodisiac properties. The zoo director is trying to obtain a mate for 'Subur', but with the present situation in Indonesia this is a formidable task.

Next we visited Hamburg, which boasts the world's first outdoor zoo, opened in 1897. Here we were captivated by the large flamingo lake with its life-like backdrop of African plains. On these "plains" zebra mingled with ostriches and a pride of lions gazed down from the heights, all showing to advantage against the natural-looking landscape. The zoo is almost free from bars. The animals are separated from other species and from the public

COPENHAGEN: a mother polar bear with two cubs. The polar bear will breed in captivity only if its enclosure includes an underground den.





BASLE: African elephants and baby. This is only the third bred in captivity outside Africa. The adults were imported from Tanzania in 1952.



HAMBURG: one of the pride of lions in the Carl Hagenbeck Tierpark, the world's first outdoor zoological gardens opened in 1897. This zoo is almost free from bars. Ditches separate the animals from the public.

by stretches of water or deep ditches.

West Berlin Zoo, third on our itinerary, has the world's widest range: 2,196 species and 12,545 animals. It is the first zoo successfully to breed the Great Bustard.

Our next stop was at Frankfurt, considered by experts to have the best zoo in Europe. Its director is the world famous conservationist, Dr. Bernhard Grzimek, who made the films *No room for Wild Animals* and *Serengeti Shall Not Die*. Among the achievements of Frankfurt Zoo are the breeding of all four species of anthropoid ape and the rare and valuable gerenuk (one of the antelope family). It is also the first zoo in Germany to exhibit a family group of proboscis monkeys and a breeding herd of the delicate okapi. The crocodile "jungle" has a special unit for the

production of artificial thunder in order to stimulate the reptiles to roar.

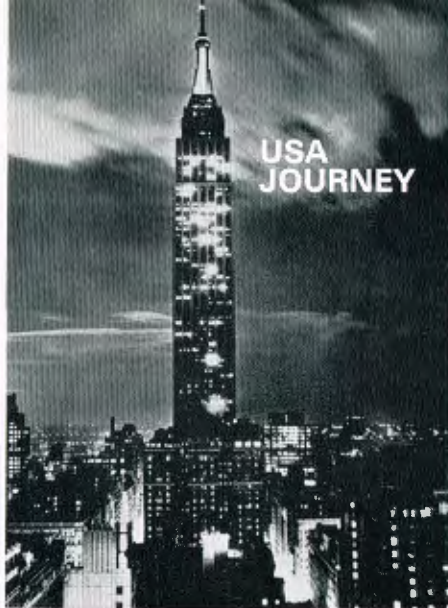
The holiday ended with a visit to Basle Zoo. Its director Dr. Lang has shown that 90% of the animals now kept in captivity can be induced to breed, even those which it was at one time thought impossible to keep alive in zoos. It was the first zoo in Europe to rear a baby gorilla, the famous "Goma". It has a breeding herd of the rare Great Indian Rhinoceros and supplies nearly all the pygmy hippos now in European zoos from breeding stock.

As a chemist I was interested to learn the valuable role chemicals play in zoo management. Chemicals like piperazine and phenothiazine are used to treat worm infestations in hoofed animals and others such as succinyl choline chloride are used as a muscle relaxant.

During the early summer a small ICI team drawn from payroll and management employees of various Divisions flew to North America on a Company visit to have a quick look at productivity techniques over there. For many members of the team this was also to be their first experience of life and leisure in North America. A member of the party from ICI Fibres Ltd., Ben Flitcroft, a draw-twist operator from the Wilton 'Terylene' plant, recounts a few of his own personal impressions to the Editor.

USA JOURNEY





Editor: Which centres in America did you visit, and how did you travel?

Flitcroft: We travelled from here to London and from London to America by air. We flew from London to Montreal, then from Montreal to New York, from there to North Carolina. After that we travelled about in a hired car before flying back to Britain.

Editor: What did you see of Montreal?

Flitcroft: Not a great deal. And what we did see was rather like any English town at first, but with two or three skyscrapers in the centre. We had a conducted tour of Montreal, and we were taken out to the newer part, which seemed more like North America as we think of it here at home. Neon lighting and signs on all the shops and stores, advertising in a way that would not be allowed in this country. Great wide roads with intersections, flyovers, and so on, that would be an English motorist's nightmare.

Editor: What about the Canadian food? Did you enjoy it?

Flitcroft: The food was excellent. All the food was well cooked and well served. The only remarkable thing was the large size of the steak. However, it was in Montreal that I first encountered the North American way of serving a salad with dressing as a kind of *hors d'œuvre* which I particularly liked.

Editor: What was the beer like?

Flitcroft: I didn't enjoy that quite so much. A lager type, rather thin compared with our North Country beers. I didn't drink much beer on the whole. The rye whisky was more to my taste, though.

Editor: Then you flew on to New York?

Flitcroft: Yes, we arrived there at about six o'clock in the evening and stayed in a hotel near Times Square. Unfortunately, we landed in fog, so I missed that first sight of the skyline from the air which is so famous. But

when we got down and out on the motorway from the airport—with five or six lanes of traffic all going very fast—this is what I thought of as America. The traffic was fantastic. New York, with blazing lights and skyscrapers, New York was America to me.

Editor: Did you get out that evening?

Flitcroft: Yes, we had a walk round Times Square. But it had been snowing when we left Montreal and it wasn't much better in New York. We managed to get up the Empire State Building. It was freezing cold, but we still went up. Looking down from the top, we saw Broadway—it seemed the odd street out in a way. All the other streets were straight and formed part of a block or square, but Broadway weaved its way from one end of New York to the other in a blaze of light.

Editor: Where did you go next?

Flitcroft: We flew on to Charlotte, capital of North Carolina, and from there we went on by car to a little place called Shelby. There we were met by a Fiber Industries Incorporated man called Dick Wells, who was to look after us for the time we were to spend with them. He took us down to the factory, where we met the manager, and we more or less got down to work straight away with the personnel people. We didn't see anything of the factory that day. Down in Carolina there was a change in attitude. Life was a lot less frantic. After the rushing about in New York, life seemed more leisurely and much more friendly.

Editor: Do they have the Southern drawl?

Flitcroft: Very much so. In fact, you might think it was put on, but it's not. They really do talk like that, a slow drawly way which I couldn't begin to imitate. All the same, the first policemen I saw with guns on were at the airport in Charlotte, strolling about with holsters. Anyway, we worked out our agenda, then we left and went to our motel.

Editor: What was that like to stay in?

Flitcroft: Marvellous. It was set out in a square, with a swimming pool in the middle. Very modern, very clean, with air-conditioning everywhere. Each of us had a complete small flat with a TV and radio in every room. We needed the air-conditioning down there in the south. Although it was only May, it was as hot as an English summer. And it gets hotter still later on.

Editor: What about the service in the motel?

Flitcroft: Well, there was a dining room in the motel, but we just had rooms for sleeping and ate either at the motel or where we happened to be during the day. Meals were not included in the motel charge.

Editor: The motel was your base?

Flitcroft: Yes, for three days. While we were looking at this FII factory.

Editor: What struck you most about the people in the factory?

Flitcroft: The operators as a body.

Editor: What was it about them?

Flitcroft: Their absolute loyalty and their pride in working for the firm. I got this kind of impression from all the operators, and particularly the two women. They thought FII was marvellous—and they were prepared to defend it and stand up and say what they thought. The management were very friendly. Wherever we went everyone was very friendly and went out of their way to make us feel at home, to make us feel comfortable. All in all, the operators made the biggest impression on me. All the operators, the women and the men, had this sense of loyalty, this sense of identity with FII. The company was their life. When it was doing well, they were happy. They took a lot of interest, not in statistics, but in the fact that production was going up (probably backed by the fact that they were getting pay increases at the same time), but nevertheless I got the impression that they were very well pleased when FII was doing well.

Editor: Why was this so?

Flitcroft: I think it's deliberately worked for by the management. I think they deliberately work at creating this atmosphere. I think the American management, what I saw of them anyway, are exceptionally good at industrial relations. They look for everything in every possible way where they can create interest, where they can create friendliness, and go out of their way to encourage this kind of impression. I think this is right. Just to give you an example, in a local paper in this town they used to run a whole portrait of a man—an employee—and his family. The same sort of thing that we do in the Divisional newspapers, but instead of being confined to FII it was sold on the streets by the newspapermen. Their slogan, you see, is "our most important asset is people."

Editor: And you reckon they live up to this, they really practise it?

Flitcroft: Oh yes, without any doubt at all they work at it, they work hard at this relationship, and it pays off. I think this is where they get this attitude from. Both parties benefit, of course. I think FII are on a par with ICI in this country in the things they do for the workers. But one thing surprised me. They don't appear to have the same welfare and amenities as we have here. We have medical centres, for instance. There's nothing like that in the plant I saw over there.

Editor: What happens if a man has an accident?

Flitcroft: Quick first aid—but nothing sophisticated. Doctors on call in the town, no doubt, but nothing on the spot, not built in as it is in this country. But the firm does have an insurance policy for workers which could meet medical expenses. Another thing that struck me is that the workers only get one week's holiday for up to three years' service, and after that I think they only get two weeks for up to eight years.

Editor: And the American worker accepts this?

Flitcroft: It's just normal, and that's all there is to it.

Editor: How about safety, etc.?

Flitcroft: I was impressed with the safety standards and the emphasis that's put on safety there, and I was impressed with the factory housekeeping, which was exceptional.

Editor: Do they have good equipment to carry out the cleaning and so on?

Flitcroft: I don't think there's anything exceptional, more or less the same as ours.

Editor: But you thought it was a very high standard?

Flitcroft: A very high standard of housekeeping, which goes along to a large extent with safety.

Editor: Where did you go next?

Flitcroft: We left on Friday and motored south to Charleston, about 260 miles.

Editor: You went right down through the south, then? What they call the Deep South?

Flitcroft: Yes; we went on through Columbia, capital of South Carolina, where we came across the shanty town area. There were these old wooden houses on stilts, just about dropping to pieces. Now it wasn't because they hadn't the money, because standing outside were these great big limousines. It was probably because if they tried to get a house anywhere else they wouldn't be able to get the land, I suppose.

Editor: What was the countryside like?

Flitcroft: Very flat. Cotton country, of course, and peaches. But we didn't see as much of the countryside as we wanted because we were travelling on the famous American roads, which really do live up to the name. Big, long, straight roads: we kept up an average of seventy for hour after hour. You can maintain that kind of speed easily. We went through this flat, very lush country, slightly wooded, along these beautiful highways into Charleston, the southern seaport, where we stayed in another motel. Next morning we made a tour of the harbour, which was very interesting. Quite a lot of it looked English, with old buildings and cobbled streets. And we saw the slave market where they used to sell the slaves in the old days, and some leg irons. Later, in the afternoon, we went into a bar for a drink and it was all shuttered and very dark. But you could see reasonably well after a while, when your eyes got used to it. Then we went out across the harbour in a boat to see Fort Sumter, where the first shots were

fired in the Civil War. An historic place.

Editor: What else did you do there then?

Flitcroft: We travelled up to a little beach which was a real seaside resort, and stayed the night there. We arrived in a great thunderstorm—I've never seen it rain so hard. Sunday morning we had a look round the shops, which were very much like the ones at an English resort—big shops selling all sorts of souvenirs—and then we went on to the beach and managed to have a swim. You could swim in the water even at that time of year, it was quite nice and warm. The thing that struck me was that you don't see many fat people in this part of the country. I don't know why. Everybody seemed to be slim! That was the impression I got. In these places, like Myrtle Beach, where you get these drugstores, like a store, all the front's open, you just sit at the bar, and they're advertising football, and hot dogs and all this kind of thing and, of course, you see people walking about in swimming trunks and bikinis in the town. A complete holiday place. I must say I've never seen such tans. Everybody was tanned, completely tanned all over. Anyway, we enjoyed our break down there, then motored back to Shelby, where we picked up our luggage and then went to the Fiber Industries plant at Greenville, South Carolina, where we spent three days covering the same ground we had covered at Shelby and getting a very similar picture. We finally left for home on the Thursday, and arrived back in England on Friday after some 24 hours' travelling.



A group of team members relaxing at Myrtle Beach: B. Coldwell, H. Jones, B. Flitcroft, M. Richmond

PEOPLE PROJECTS PRODUCTS

ICI signs agreement with Russia

A five-year agreement with Russia covering co-operation in certain fields of scientific and technical development was signed at Imperial Chemical House on 17th October. Academician V. A. Kirillin, Deputy Prime Minister of the USSR and Chairman of the State Committee for Science and Technology, signed on behalf of the Soviet Union and Sir Paul Chambers, ICI Chairman, signed for the Company.

Preliminary discussions on the possibility of such an agreement started when Sir Paul met Mr. Kosygin in Moscow in May 1964, since when senior technical delegations have been exchanged for the purpose of assessing facilities available within ICI and within the Soviet chemical industry. While not defining specific projects or processes, the agreement, which covers plastics, petrochemicals and synthetic fibres, sets out the lines along which both sides wish to see co-operation developed.

In welcoming the Russian visitors Sir Paul said that ICI looked forward to a long period of happy and fruitful collaboration with the Soviet Union, which had the largest chemical research organization in the world. "I believe", he said, "that good international relations, like good human relations, are founded upon mutual advantage and not upon gifts one way or the other."

In his reply, Mr. Kirillin said he felt that good relations between countries could be extended and developed to mutual advantage only where there was an economic basis for them, and that was the main purpose of the current visit of the Russian delegation to Britain.



In the Board Room at Imperial Chemical House Sir Paul Chambers, ICI Chairman, looks on as Mr. V. A. Kirillin, Deputy Prime Minister of the USSR, signs the scientific and technical agreement between Russia and ICI. Standing are Mr. Martin Wray (left) and Mr. Jack Peel of East European Department.

Board changes

Mr. C. M. Wright, the Company's Personnel Director and Liaison Director for Mond Division, retired at the end of November after 39 years' service with the Company. An appreciation by Sir Ronald Holroyd, one of ICI's Deputy Chairmen, appears on page 199.

Mr. Wright has been succeeded as Personnel Director by Mr. Rowland Wright, formerly Organization and Services Director. Mr. Rowland Wright continues as Agricultural Division Liaison Director. Dr. John Sisson becomes Organization and Services Director in place of Mr. Rowland Wright and Mond Division Liaison Director in place of Mr. C. M. Wright. These duties are in addition to his present responsibilities as Building Products Field Director and Territorial Director for Latin America and the Caribbean. Mr. Colin Bagnall, in addition to his duties as Commercial Director and Territorial Director for Africa, is the new Nobel Division Liaison Director in place of Dr. Sisson.



Mr. Rowland Wright



Dr. John Sisson



Mr. Colin Bagnall

"Campesinos" see ICI products

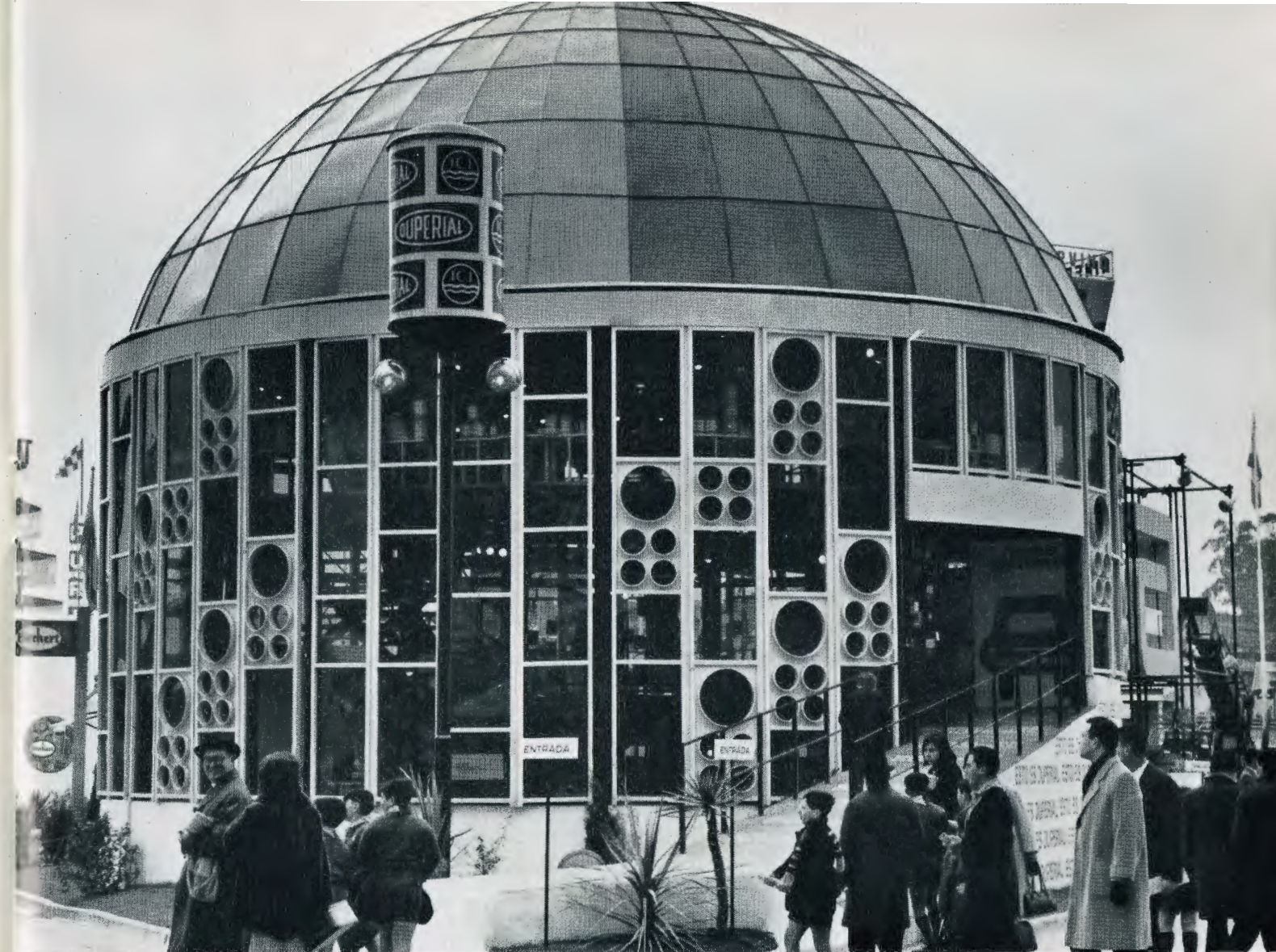
Nearly a century ago, in 1878, the Argentine Rural Society, founded in July 1866, held its first livestock show in up-country Cordoba to celebrate the inauguration of the railway linking the town with Buenos Aires 450 miles to the north. In July 1966, Argentina celebrated the 150th anniversary of her independence, while the Argentine Rural Society celebrated its own centenary. To commemorate this occasion the Rural Society put on the greatest

show in its history. Over 5,000 pedigree animals of all sorts, shapes and sizes came up for judging in a show seen by 1,000,000 visitors during the last week in July and the first week in August. "Campesinos" as the men from the ranches are known, flocked into Buenos Aires from all over the country.

In the week before the show officially opens, the judges select the winners. But for the

"Campesinos" the climax of the show is always the day before the opening, when the first prizewinners of the main cattle breeds - Aberdeen Angus, Shorthorn, Hereford - are brought into the central arena for the final selection of the champion in each class.

It was English, Scottish and Welsh farmers, arriving in Argentina 150 years ago, who pioneered the country's breeding of cattle



The Duperial Argentina pavilion at the Argentine Rural Society's centennial show. The multi-coloured acrylic-walled construction was topped by a six-ton revolving dome.

and sheep. Local stock had little or no quality so they imported breed animals from Europe. In the 'miracle of the pampas' their enterprise converted a few hundred head of cattle (and no sheep) into today's 50,000,000 sheep and 46,000,000 cattle.

The organisers of the show also staged a large industrial exhibition in which ICI's subsidiary company Duperial Argentina played a key part. Hundreds of pavilions and stands, covering 27 acres, showed locally manufactured and imported goods; motor-cars, railway coaches, agricultural chemicals and machinery, veterinary products, petrochemicals, plastics, paints and textiles.

Visitors to the Duperial stand saw the important contribution made by the company to the Argentine car industry, in particular with modern acrylic finishes; the wide range of agricultural products - fertilizers, weed-killers including 'Gramoxone', seed dressings and veterinary products - and the applications of polythene (from their San Lorenzo plant) which Duperial are developing in agriculture and horticulture. There was also a display of the products of Orbea, an associated company, which dominates the Argentine market for sporting ammunition.

New 'Melinex' plants

The commissioning of two new plants, in



Members of an International Atomic Energy Agency Study Group visited Heavy Organic Chemicals Division's Olefine Works at Wilton on 3rd October to discuss industrial applications of radio isotope techniques with members of the Division's research department. Visiting delegates were from Argentina, Bulgaria, Greece, Hungary, India, Iraq, Israel, Mexico, Pakistan, Phillipines, Poland, Thailand, Yugoslavia and the United Arab Republic.



Britain and Holland, has more than doubled ICI's 'Melinex' polyester film capacity. The UK plant is at Dumfries, where Plastics Division began to make 'Melinex' in 1961. It raises ICI's UK capacity of this tough, transparent plastic from 6,000 tons to 10,000 tons a year. Current consumption of polyester film in Britain is about 3,000 tons but large tonnages go to Europe and North America.

The second new plant, the first 'Melinex' plant to be built by ICI overseas, is at Rozenburg, near Rotterdam. Operated by ICI (Europa) Ltd., it has a starting capacity of 3,000 tons a year, and its production will be sold mainly in the EEC.

Plastics Division reports a very rapid build-up in demand for 'Melinex', particularly for specialised grades such as 'Melinex 226', a tough insulating material for electric motors introduced earlier this year, and a recently introduced blue-coloured type which is used as a base for X-ray films.

The plants will also supply increased quantities of established grades for use in the printing, photographic and magnetic tape industries, as drafting and reprographic materials for drawing office use, and for typewriter carbons, electric cable lapping and embossing foil.

New oil and gas search

BP and ICI are jointly carrying out a geo-physical survey for oil and natural gas in north-east Yorkshire. The survey is in an area to the east of Goathland and Grosmont and south of Eskdale, Yorkshire, where the first natural gas discovery in England of commercial significance was made by BP in 1938. In the 1950s further small discoveries were made at Eskdale by BP and ICI which justified the installation of a natural gas pipeline.

The discovery by Home Oil on a BP farmout area earlier this year of a substantial gas field about four miles from the Eskdale area, together with recent improvements in prospecting methods, have encouraged BP and ICI to do a new survey of the area.

The survey has already started and is expected to take about two months working

An aerial view of the Rozenburg site near Rotterdam. The E-shaped building in the centre is the newly commissioned 3,000-ton 'Melinex' polyester film plant, the first built by ICI overseas.

time. Operations will be suspended during the winter but may be resumed in the spring. Any decision to drill will depend on the results of the survey.

Cement plant turns waste to profit

ICI's new cement plant at Tunstead Quarry, near Buxton, is now working at full capacity. The plant, designed to produce about 200,000 tons a year, is a new venture for the Lime Group of Mond Division and uses as one of its principal raw materials the thin slurry that remains after the limestone has been crushed, screened and washed. Hitherto, this slurry has been disposed of by pumping it into old quarries to settle.

The plant is one selected for the installation of a digital process control computer. The preparation of the raw material "feed" and the operation of the kiln is controlled by one of the six Ferranti Argus computers recently ordered by ICI. Ultimately it is hoped that the computer will be used to control the whole of the process.

All the cement produced, apart from a small amount to meet ICI's local needs, will be sold directly to Associated Portland Cement who will despatch by road to their customers in the North-West.

Welding stainless steel by explosives

In the construction of any chemical plant using or making corrosive gases or liquids, a metal resistant to their attack is the first essential. Stainless steel is the normal choice. Mild steel, although much cheaper, cannot be used because it would corrode, produce impure end-products and quickly become so damaged as to be worthless. If the mild steel vessels in which corrosion could occur, can be lined with a tough skin of stainless steel worthwhile savings result.

One method is to weld the mild steel and the



A street in Sasolburg in South Africa has been named Billingham Street in honour of the association between ICI and Sasol. Here during a recent visit to South Africa Sir Paul Chambers, ICI Chairman, is seen (third from left) standing in front of the street name plate with (left to right) Mr. David de Villiers, General Manager of Sasol, Dr. Etienne Rousseau, Sasol Chairman, and Mr. Colin Bagnall, ICI Commercial Director. Sasolburg is the residential town for Sasol, the South African Government controlled factory where coal mined locally is converted into oil and petrol. African Explosives and Chemical Industries, ICI's associated company in South Africa has a new factory nearby.

stainless steel together by explosive. Nobel Division recently set up a field station in a disused quarry near Buxton to do just this. They chose the site because it is near the main centres of stainless steel production. Mild steel and stainless steel plates brought to the field station early in the morning can be welded and returned to the steelmakers in the afternoon.

While the first commercial work was done on mild steel and stainless steel, Nobel Division now also offers a similar service for welding mild steel and titanium.

Open day at Severnside

New plaster and plasterboard plants, representing a major expansion in products for the building industry, are now on stream at Severnside. An open day for the press and representatives of the building industry was held there recently. Among the guests was Mr. James Boyden, Parliamentary Secretary to the Ministry of Public Building and Works.

The plasterboard plant can produce the full British Standard range of gypsum plasterboard. Almost fully automatic, it can turn out 13½ million sq. yds. annually. The plaster plant continues Agricultural Division's policy of using gypsum from the nearby fertilizer complex, but the process used for converting the gypsum into stucco is a new one, developed



Rodin's famous sculpture "The Kiss" forms an unusual background for four girls who modelled Bri-Nylon, 'Terylene' and 'Crimplene' clothes at ICI Fibres' recent presentation of spring fashions at the Tate Gallery. Three men and fifteen girls displayed over 150 garments on a 'silver' catwalk set up in the Sculpture Hall. The gallery was lent for the occasion by the Trustees in collaboration with the Friends of the Tate.

within the Division. The plant can produce 35,000 tons a year.

Scientist's Lancaster University post

Lancaster, one of the first universities in the world to offer postgraduate training in systems engineering, has appointed Dr. Phillip Youle, Head of Heavy Organic Chemicals Division's Central Investigation Group, as part-time professor in the new Department of Systems Engineering. The aim of systems engineering is to enable plants to be designed and built more economically, and to operate at higher profitability and greater management efficiency.

Dr. Youle, one of the pioneers of the systems approach in British industry, took first class honours in chemistry at Sheffield University, and subsequently won a Harkness Fellowship enabling him to continue post-graduate studies at the University of California. He joined ICI in 1940, in the research department of Dyestuffs Division. With the increasing involvement of ICI with synthetic

fibres, he worked first on nylon and then on 'Terylene' problems as assistant research manager to the then Fibres Division. He transferred to HOC Division to take charge of exploratory petrochemicals research, and in 1965 was appointed head of the Central Investigation Group, responsible for the application of systems engineering within the Division.

To head Fire Service Inquiry

Sir Ronald Holroyd, one of ICI's Deputy Chairmen, is to chair a committee of inquiry into Britain's fire services. The inquiry – the first for 30 years – has been set up jointly by the Home Office and the Scottish Office. Sir Ronald's appointment as chairman was announced to the House of Commons by Mr. Roy Jenkins, the Home Secretary, on 14th November. The committee will review and make recommendations on the organization, efficiency, pay and recruiting machinery and other aspects of the fire services and the need for more fire research. The inquiry is expected to take about two years.

MR. C. M. WRIGHT RETIRES



Mr. C. M. Wright, the Company's Personnel Director and Liaison Director for Mond Division, retired on 30th November after over 39 years' service. Sir Ronald Holroyd, one of ICI's Deputy Chairmen, writes:

With the retirement of Mr. C. M. Wright at the end of November, ICI lost one of its best known and respected figures. Joining the Company at Billingham in 1927 "Squibs", as he has been affectionately known to everyone since his university days, soon became involved in plant management, an activity in which he could combine his professional interest in science and technology with his even greater interest in people. In 1942 he became the first works manager of Prudhoe Factory and, subsequently, manager of Gas and Power Works, works general manager, and in 1952 a Billingham Division director.

The experience thus gained stood him in good stead when he was appointed in 1954 as Chairman of Wilton Council, a position requiring a great deal of understanding and tact to bring about the merging of many individual interests with that of Wilton as a whole. In 1957 Mr. Wright joined the Main Board of ICI as Development Director, becoming Personnel Director in 1959.

One of Squibs' outstanding qualities is his approachability and he has always been as much at home on the shop floor as in the Board room. Anyone meeting him either officially or on a social occasion was struck by his calm and unassuming nature and by his willingness and keenness to listen to all points of view. It was this which has gained him the well deserved reputation for fair and balanced judgment based wherever possible on close personal knowledge.

Squibs has always been a keen sportsman. In his early days at Billingham he captained both the Synthonia rugby and cricket teams and he is still an enthusiastic and very competent golfer. He has been honoured by his old University (London) by being made a Fellow of University College and has undertaken outside duties such as membership of the NEDC for the Chemical Industry and of the Council of the Foundation for Management Education.

We all wish him health and happiness in his retirement.

WHY AMERICA MAKES MORE PER MAN



Mr. Bruce Neale reports

THE CHEMICAL INDUSTRY AS AN EMPLOYER

A job in the chemical industry in North America is regarded with favour and new works are able to select from many applicants to fill their vacancies; men are willing to re-locate themselves for this purpose. High wages are paid; the employment is stable; the whole "package" of fringe benefits and employment conditions is good and the chemical industry offers interesting work and good promotion opportunities.

ORGANISATION

Management and supervisory organisation varied with the size of the works and the complexity of the manufacturing operations, but there were a number of common features. Production and engineering organisations were clear and simple, and in almost every case with fewer levels than is typical in ICI. Day-to-day maintenance was usually the responsibility of the production managers, with specialist or major engineering work being undertaken by groups organised on an area or works basis. In circumstances where extra technical effort was required it was generally provided through some appropriate technical group outside the normal

The Company summary report on the productivity studies made by joint ICI staff and payroll teams which visited Canada and the USA earlier this year was discussed at the 62nd meeting of Central Council at Blackpool on 18th November.

Mr. Bruce Neale, general personnel manager of Agricultural Division, who presented the report to the Council, summarised in it the observations and conclusions contained in reports prepared by each of the six teams for their Division chairmen. Wherever possible, he gave a consensus of opinion on the main points.

The teams went to North America to study the various factors (other than technical process know-how) which affect productivity in the firms visited, and covered a wide cross-section of both staff and payroll.

Each team prepared its own detailed check-list of questions and made preliminary studies in the UK to gain experience in collecting information and evaluating observations. After a day at the Montreal headquarters of Canadian Industries Limited, ICI's subsidiary company in Canada, the teams split up to visit a total of nine CIL works and ten other companies in Canada and the US. So far as was possible, each team examined plants similar to those in ICI. They spent about two weeks on the studies and each visited three or four locations. The general pattern for each visit was an opening discussion between the whole team and members of the management, followed by a tour of the plant. The team then split up into small working groups to make more detailed observations and to ask questions of people doing the same sort of work as they themselves do in the UK. These ranged from senior managers to operators and tradesmen, all of whom answered questions quite freely. The following extracts (not in sequence) are from the report.

line management organisation required for regular operations. Another significant feature was the absence, in quite large works, of specialists at the managerial level in such activities as instruments, electronics and civil engineering.

It was typical in the medium sized works to find activities such as supply, accounting, distribution and records grouped under one manager or without a specialist manager. These activities, organised with office machinery freely available and flexible use of clerical workers to deal with the peaks, were run at the minimum level required to provide an adequate service to production and sales.

UNION ORGANISATION

Two-thirds of the works visited were unionised. In no case was there a "closed shop" but membership figures were high, ranging from about 70% to virtually 100%. Union contributions were frequently deducted from wages. An industrial Union structure was typical, i.e. one Union "Local" represented all types of payroll employees at each works. The President of the Union Local and the Bargaining Committee (employees of the Company who generally spend a relatively

small part of their time on Union business), assisted by a Union Agent (a full-time Union official), negotiate wages and conditions for the works with the Manager.

The local basis for negotiations no doubt contributed to the obvious interest in the works as a self-contained unit, which resulted in general concern for the works' productivity, its safety record and so on, as well as in a rational approach to working arrangements on the part of groups of employees.

WAGES AND HOURS

In general the wages structures encountered were very simple; there were no incentive bonus schemes and supplementary payments, for example for conditions, were rare. Payment was usually by cheque and fortnightly. The basic hourly rates of the top operators' jobs were of the same order as those of the top tradesmen. Shift payments were low (typically, nothing for the morning shift, 7-12 cents/hour for the afternoon shift and 10-18 cents/hour for the night shift) and no premium time was paid for shift working at the week-ends. Because of these arrangements the top 3-shift continuous shift process worker earned about the same

amount for a 40-hour week on shifts as the top tradesman for 40 hours on days. This is not, of course, dissimilar from the practices prevailing in ICI.

Wage rates, which varied substantially from locality to locality, were sometimes as much as twice as high as in the UK on the basis of a straight monetary conversion from dollars to pounds sterling. This direct comparison did not reveal the true position because habits and customs, the tax arrangements, the provision of State services and the cost of living were different in North America. Overall, the teams concluded that the Canadians and Americans in the firms visited enjoy a standard of living about 50% higher than their counterparts in the UK.

The normal working week was 40 hours. Staff on production generally work the same or very similar hours to those worked by payroll employees. In some locations the foremen arrived before the payroll employees, to ensure that work and material were ready and available when payroll employees reported. Work was started promptly on arrival, meal breaks and tea breaks were short, and times were observed without close and direct supervision from the foreman. In general it can be concluded that more actual hours were spent working each day than in ICI.

The basis for overtime payments was similar to that which prevails in ICI but the levels of overtime working were extremely low, being generally less than 5%, which is about half the typical figure for ICI.

DELEGATION

All the teams commented on the way in which the companies visited had been successful in pushing responsibility for work down the line. These responsibilities are undertaken as a matter of course by employees at operator and tradesman level, who carry substantially more direct responsibility than many of their counterparts in ICI. Payroll employees do not expect, as competent and trained people, to have their work closely supervised and checked. Foremen set out to foster and sustain this attitude without abandoning their ultimate responsibility and control.

WORKING PRACTICES

The basic principles governing the allocation of work between operators and tradesmen were the competence of the process operator to do the required maintenance work and the urgency of the job. This meant that operators, who were provided with tool kits and spares on the plants, did many day-to-day maintenance tasks of the simpler kind such as changing valves and instrument charts, remaking leaking pipe joints, slip-plating, repacking pump glands, greasing,

oiling and painting. Because of this practice there were few shift maintenance men. Many of these activities were undertaken at other times by tradesmen when this arrangement was more efficient in the use of people.

Tradesmen were rarely provided with helpers, assistance being given, when necessary, primarily by other tradesmen or by operators. Considerable flexibility existed on maintenance work between the various skills, and tradesmen of various kinds were grouped under one foreman. Tradesmen, most of whom had a basic understanding of the process, were expected to be adaptable and were recruited on that basis.

The philosophy appeared to be to restrict maintenance work to the minimum necessary to keep the plant in production.

COSTS

The teams reported that people they talked to were concerned about "the business," "work," "profit," "the dollar." Cost consciousness was manifested most often through the wide acceptance of the need to eliminate inefficient methods of work, to reduce plant downtime, to increase outputs and improve quality. Employees at all levels realised that the firm's survival and their own jobs depended on efficiency and profitability. Associated with this attitude was the acceptance of the necessity for change.

MANNING COMPARISONS

Exact manning comparisons proved to be somewhat difficult to make since so many factors influenced the number of people employed, e.g. the nature of the plant, the variety of its products, the extent to which contractors were used, plant reliability and so on. As a generalisation, however, all the teams concluded that in the North American firms fewer people, both staff and payroll, were employed on similar operations.

This was not due to harder work in the North American companies. Although work-measured incentive schemes were not encountered, work-study techniques were used for manning and for planning. Information of a work-study nature and observations on the job, led the teams to conclude that in general the rate of working was no higher than on similar work in ICI and in a number of cases the rate of work was judged to be lower. There was no evidence to suggest that tools or labour-saving equipment were very different from those available in ICI, except that a variety of sophisticated radio and telephonic systems made inter-communications very easy.

Nor could the use of contractors be held to account for the differences in numbers. Capital developments were always contracted out, and in small works where there was an annual shut-down of the whole plant

THE CONCLUSIONS

The teams' main conclusions refer to the reasons for the greater efficiency which they found in the use of manpower. Many reasons were suggested with greater or lesser emphasis and the following are generally viewed as being the most important.

1. Responsibility is successfully delegated to managers and supervisors resulting in simple organisational structures and minimum manning at these levels.
2. Payroll employees want and expect to be personally responsible for much of their work. Supervision and checking is, therefore, less close and fewer supervisors are necessary. Payroll jobs are more satisfying and interesting because of this.
3. Considerable flexibility exists in the allocation of work between operators, tradesmen and assistants, which results in better utilisation of manpower and in more interesting and varied jobs.
4. At all levels there is a real sense of involvement with the fortunes and prospects of the company, and especially the local unit in which people work. This is reflected in awareness of the need for efficiency, profitability, high output, good quality product and minimum downtime.
5. Individual employees are self-reliant. They are frequently motivated by a desire for self-improvement, to seek training and education which increase their skill, knowledge, and chances of advancement.

the peak load would be undertaken by contractors. But in other works where the maintenance activity did not involve such peaks, or where suitable contractors were not easily available, the proportion contracted out was no different from that prevailing in ICI.

In a number of cases, it was possible for teams to compare the operator-manning and maintenance effort on plants similar to those which exist in ICI. These clear comparisons, and observations in other cases less obviously comparable, led the teams to conclude that the North American firms were significantly more efficient in their use of people than ICI, by as much as 50% in some cases.

From a variety of different observations, the following generalisations emerge. There were somewhat fewer managers especially in the direct "chain-of-command" on production. There were fewer supervisors on both process and maintenance activities. The number of process operators was a little smaller on some North American plants. The number of maintenance workers, both tradesmen and support workers, was significantly fewer. The number of clerks in such ancillary activities as supply, distribution, records and wages payment was smaller.

The chemistry of LIFE

The baths at Buxton Spa used to display plaques giving an ancient analysis of the waters, designed to advertise their health-giving properties. At the bottom of a list of medicinal-sounding salts came the punch-line—a small percentage of “substances unknown to science.”

This serves to show how mysticism persists even in an age of science. By the beginning of the nineteenth century the science of chemistry had gone a long way in analysing mineral nature into compounds of elementary substances, but it still seemed to many people that the secrets of life and health were likely to be beyond such down-to-earth scientific analysis.

Indeed, it seemed so to many chemists, although *they* knew that living tissues could be analysed, just as well as mineral substances, into ordinary chemical elements, notably carbon, hydrogen, oxygen and nitrogen, with a few others coming in occasionally. By the second decade of the 19th century many of the oils, sugars and other substances produced by living organisms had been reduced to chemical formulae as straightforward as H_2O . They were more complicated than H_2O , however, and many scientists continued to believe that a mysterious “vital force” was necessary to produce complex substances like this.

This led chemists to believe that their science would develop along two distinct lines, “inorganic” and “organic” chemistry. The discovery which shattered this mystical distinction came in 1828, when a young German chemist, Friedrich Wöhler, found he could make urea, an “organic” compound found in urine, by laboratory preparation from entirely mineral sources, “without the need of kidneys or any animal whatsoever.” After this there was no division in principle between organic and inorganic chemistry. Yet the verbal distinction persisted, because it proved a useful way of defining two types of chemistry that are different in practice.

The tissues, fluids and other components

of living organisms are in general compounds based on carbon, and carbon has the capacity to form compounds of enormous complexity, to cope with which chemists had to learn what was virtually a new language. The development of that language involved one of the most remarkable stories in the whole history of science.

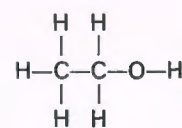
Friedrich August Kekulé, a German scientist working in London in the 1850s, fell into a reverie on top of a bus one day and saw atoms gambolling about in a great dance. Some of them joined hands in long chains—and Kekulé came to with a start, to realise that the clue to the complexity of carbon-compounds was to be found in thinking of them as chain-like structures. For example, each tiny particle (or “molecule”) of alcohol is a structure of carbon, hydrogen and oxygen atoms which can be diagrammatically represented as in Figure 1. Some chemists, notably Wöhler, had

already begun to grasp something of this before Kekulé had his inspiration, but he brought home the notion that carbon atoms could join up in dozens—in branched chains as well as straight ones, with atoms of other elements attached—and thereby make possible an immense range of extremely subtle variations. Then in 1865, when he had settled down as a professor in Ghent, he did it again! Dozing in front of the fire in his study, he once more dreamt of atoms dancing, and it seemed as if their interweaving chains were rather like snakes. Suddenly one snake bit its own tail, and Kekulé awoke to realise that carbon atoms could form rings as well as chains. This solved the hitherto puzzling problem of the structure of benzene, which turned out to have a ring of six carbon atoms, each attached to one of hydrogen, in every molecule.

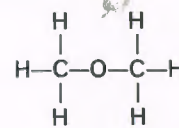
This ring-structure has subsequently proved to be such a common building-block

FIGURE 1

The formula $\text{C}_2\text{H}_6\text{O}$ can stand for two quite different compounds, as is shown by drawing them out as structures of carbon, hydrogen and oxygen atoms thus:

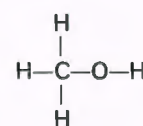


Alcohol

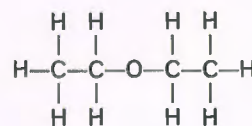


Dimethyl ether

Chemically, alcohol resembles methanol, the poisonous principle of wood alcohol, which has the quite different basic formula CH_4O , while dimethyl ether resembles ordinary medical ether, which has the basic formula $\text{C}_4\text{H}_{10}\text{O}$; this resemblance too is brought out by drawing them as structures:



Methanol



Ether

in nature that it is often written as a pure diagram, the hexagon shown in Figure 2.

By Kekulé's time there were a good many entirely artificial materials using this building-block, as well as natural ones. With mysticism overthrown, organic chemistry had ceased to be a merely passive science of natural materials, and had become a synthetic science producing substances quite unknown in nature. In the late 1850's, following upon W. G. Perkin's accidental discovery of mauveine, the first entirely synthetic dyestuff, it began to achieve the scale of technology.

Significantly, however, Perkin's discovery was made while he was trying to synthesise quinine, and organic chemistry never completely cut itself off from its traditional relationship to matters of life and health. Throughout the second half of the nineteenth century, in the laboratories of the booming dyestuffs industry that grew out of Perkin's discovery, as well as in academic laboratories, a continuous search for materials of medicinal interest went forward. Perhaps the most important single discovery was aspirin, introduced in 1899 and probably still the most popular of all pain-relieving drugs. It was a benzene ring derivative, and in the early years of the 20th century other materials based on this building-block were found to be useful as local anaesthetics, the most notable being novocaine. And on a rather different front, chemists began to make important contributions to problems of feeding. The first synthetic flavouring material, saccharin, was discovered (yet another benzene ring derivative) in the 1880s, and at the turn of the century Sabatier used chemistry to give the world a new cheap food—margarine, made by treating vegetable oils with hydrogen.

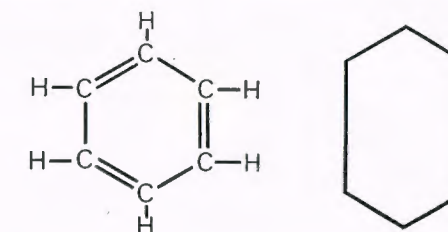
It became fashionable to speak of “the miracle of chemistry”—yet for the general public the “image” of chemistry and the chemical industry remained a dubious one right up to World War II. People thought of factories polluting the atmosphere to make “cheap and nasty” substitutes for honest natural materials, or perhaps even “poison gas.” Then during the 1940's people began to become aware of nylon and ‘Perspex’, clearly materials in their own right rather than substitutes, and, even more important, the “wonder drugs” were seen to transform the whole pattern of medicine.

The story of the “wonder drugs” is typical of a great many revolutionary scientific and technological advances. The most famous, penicillin, was the result of Professor Alexander Fleming's brilliant chance observation that the mould *penicillium notatum* produced a substance with astonishing

FIGURE 2



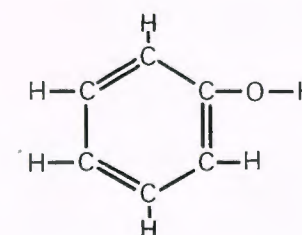
The snake biting its own tail is an ancient mystical symbol. The Greeks had a word for it—*ouroboros*—but it occurs in many Eastern traditions too.



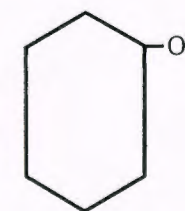
Kekulé's vision of this ancient symbol gave him the clue to the structure of benzene as a ring of carbon atoms with hydrogens attached. This is such a common building-block in chemistry that it is often written as a pure diagram, as shown.

FIGURE 3

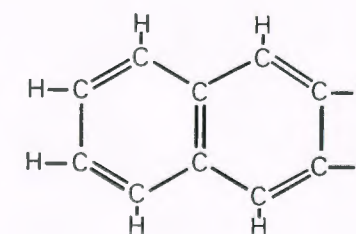
The ring-structure of benzene turns out to be a very common building-block in nature, e.g. in the well-known coal-tar constituents phenol (carbolic) and naphthalene (moth balls):



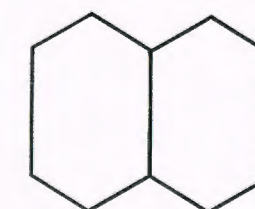
commonly
written
diagrammatically



Phenol

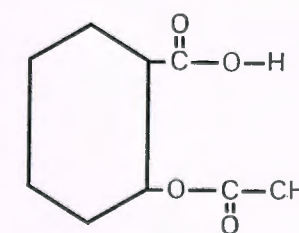


commonly
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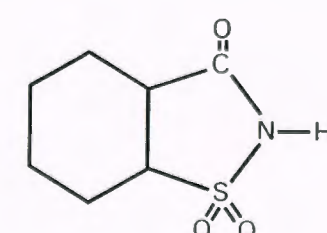


Naphthalene

Many important new inventions have been based on the same building-block. It is especially important in dyestuffs chemistry (hence Hexagon House, the Dyestuffs Division H.Q.) but it occurs also in saccharin and aspirin:



Aspirin
(acetylsalicylic acid)



Saccharin

As John Wren-Lewis explained in the first of his "Frontiers of Change" articles in our last issue, a major development in chemicals manufacture over recent years has been the switch from coal to oil as a raw material. Within ICI the effects of this change are most apparent in the North-East, where the growth of Wilton and a massive redevelopment at Billingham have alike been based on the use of oil – and in particular of one oil product, naphtha. Produced from crude oil by distillation, naphtha is a vital feedstock for making ammonia, fertilizers, synthetic fibres and plastics. Now, for the first time, ICI can get a large part of its supplies from one of its own subsidiary companies, with the building and start-up by Phillips-Imperial Petroleum Ltd. of

TEES-SIDE'S NEW REFINERY

Officially opened at the end of September by the Minister of Power, Mr. Richard Marsh, the first major oil refinery in the North-East will process 4m. tons a year. It is owned and operated by Phillips-Imperial Petroleum Ltd. which in turn is jointly owned by ICI and Phillips Petroleum Company of Bartlesville, Oklahoma, a £900m. concern which employs about 30,000 in many parts of the world. The refinery scores three other "firsts": it is the first in Britain designed for operation on North African crude oil, which has a particularly low sulphur content; the first to produce a varied range of products under joint British and American ownership; and the first to be built for optimum production of chemical feedstock rather than petrol or fuel oils.

Built on land reclaimed from the Tees by the dumping of spoil from steelworks' slag heaps, the refinery is on the north bank of the river, not far from Billingham and across the river from Wilton. It stands alongside an earlier 1m.-tons-a-year distillation unit which Phillips-Imperial took over last year from ICI and which has been supplementing the naphtha so far bought by ICI from various oil companies. Both units are now run together.

The new refinery is part of a £10m. capital development which has included the building of a new road and rail distribution terminal two miles away, storage tanks, and a riverside jetty big enough to take tankers of up to 60,000 tons and capable of extension to deal with even bigger ships of up to 80,000 tons.

In addition to naphtha, which can be conveniently piped to both Billingham and Wilton, the refinery will supply ICI with some fuel oil. The other products – kerosenes, diesel fuels, gas oil and fuel oil – will be sold by Phillips Petroleum through a wholly-owned marketing subsidiary, Phillips Petroleum Products Ltd. These will be delivered from the new distribution centre by road tankers, eight of which can be loaded at once, at a rate of 300 gallons a minute for each vehicle, or in rail tank wagons. Tank wagon trains can be loaded at 1200 gallons a minute, and the use of a remotely-controlled wagon haulage

bogie to move the wagons into position directly under the loading platform makes a shunting engine unnecessary.

The refinery is of obvious importance to both ICI and to Phillips Petroleum, and it is important too for Tees-side. It will help to make Tees-side a major oil port, and no one appreciates this more than the Tees Conservancy Commissioners, who are spending £4.5m. on widening and deepening the river to allow 60,000-ton tankers where previously the upper limit was only 25,000 tons. The 242-ft long jetty has a 60-ft tall installation for handling the seven large-diameter pipes through which crude oil is pumped ashore or refinery products loaded into ships for distribution by sea. Another jetty had also been built on the south side of the river to serve another refinery being built by Shell which is due for completion early next year.

The opening of the Phillips-Imperial refinery has coincided with news of fresh discoveries of natural gas under the North Sea. This has created some speculation about their possible effect on the future of naphtha as a chemical raw material and therefore, by implication, about the future of the new unit. These were dealt with at the opening by Sir Ronald Holroyd, a Deputy Chairman of ICI and Chairman of Phillips-Imperial. He said that by 1970, when important supplies of natural gas are expected to be available, ICI would need about four-and-a-half million tons a year of naphtha or its equivalent for the four main branches of its petrochemical business. These four branches were based on (1) steam reforming of naphtha to give hydrogen as a basis for making ammonia and methanol; (2) the cracking of naphtha to produce olefines such as ethylene, propylene, butylene and butadiene; (3) the production of aromatics; and (4) turning naphtha into acetylene.

Assuming that it proved to be mainly methane, which seemed likely, the North Sea gas could with some advantage replace naphtha for hydrogen, methanol, ammonia, fertilizers and so on. It was also theoretically possible to use natural gas instead of naphtha for making acetylene, but it certainly could not replace



The crude-oil heater on the new unit

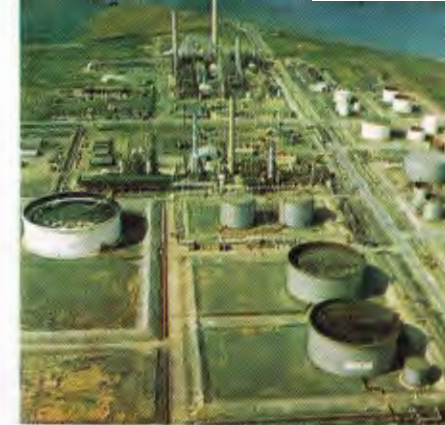
naphtha as a cracking stock or as a raw material for aromatics.

Given some modifications to plant, this meant that a maximum of 2m. tons a year of naphtha could be replaced from 1970 onwards by natural gas. This would leave an essential naphtha requirement of two and a half million tons, which was still more than double the capacity of the new refinery. Full use could therefore be made of the natural gas – and the refinery would still be operated at full capacity. There would as a result be a reduction in imports of naphtha.

Sir Ronald also said it was hoped that when the time came for allocation of North Sea gas for various uses, and the fixing of

prices, maximum encouragement would be given to the use of gas as a petrochemical feedstock. This would reduce naphtha imports and should help to stabilise the price of such naphtha as had still to be bought from overseas.

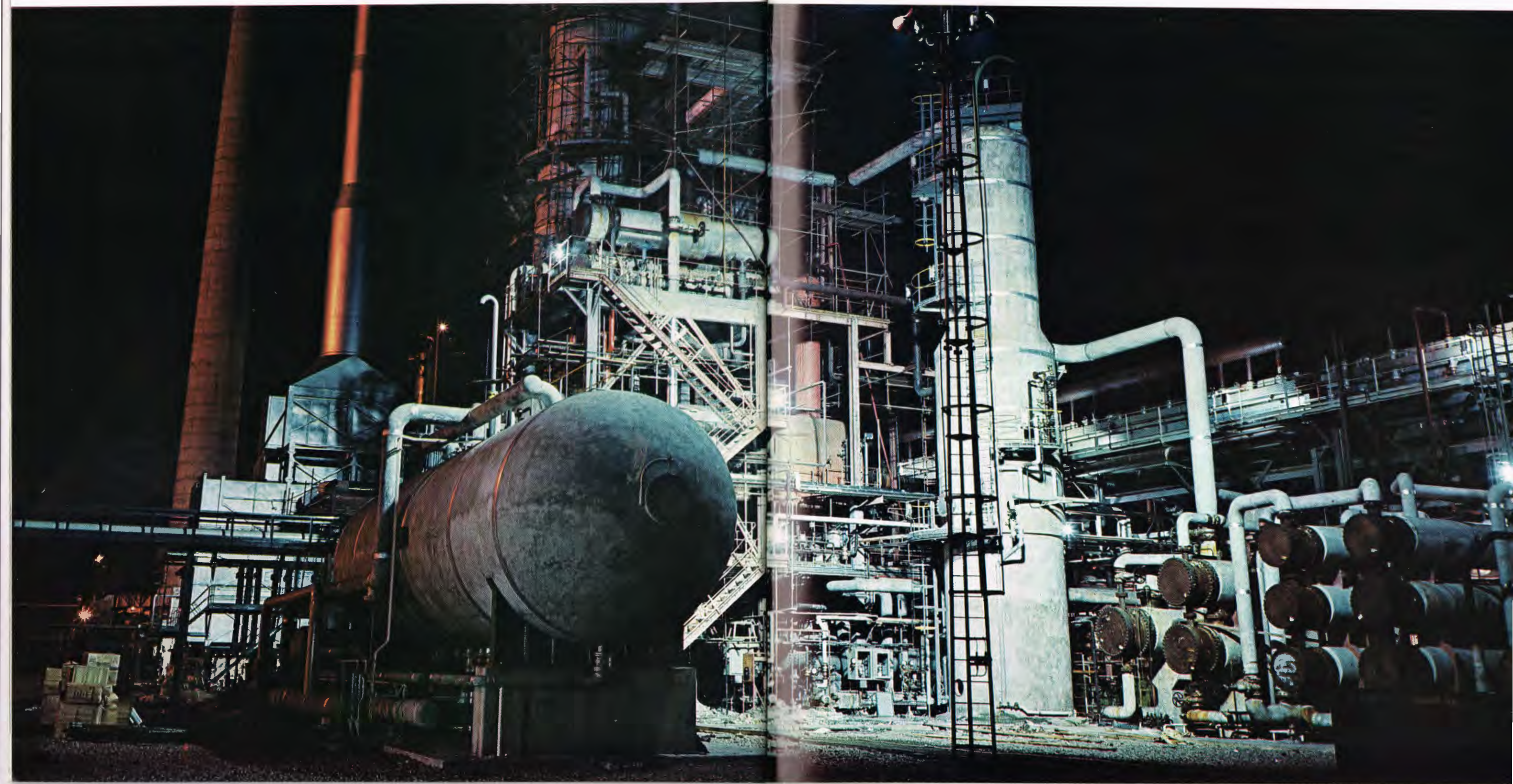
It also appeared to be a most effective way of using this natural asset to make Britain more competitive in the export of such products as fertilizers. Throughout the planning of its petrochemical complex ICI had always put emphasis on flexibility in the use of raw materials, and on Tees-side the extent to which naphtha, heavier oil or natural gas could be used is variable over fairly wide limits.



An aerial view of the refinery, which is built on reclaimed land on the north bank of the Tees

Below: A night scene during construction, with the de-salting unit in the left foreground

PHOTOGRAPHS BY J. SELWYN FELL (HOC DIVISION PHOTOGRAPHIC SECTION)



SWEDEN Paradox and

Think of a country nearly twice the size of Britain—but all of it lying north of the Tweed; where less than one-fiftieth of the total area can be used for intensive farming and the rest is forest and mountain, with hard-won smallholdings and grazing land scattered here and there; where the whole population is smaller than Greater London's, with only three cities of more than 100,000 people; and where up to 50 degrees of frost

in winter is quite usual in most areas. Yet this same country has achieved the highest living standards in Europe and the third highest in the world. It also offers the benefits of an enlightened Welfare State to everyone in the country, has banished poverty and has virtually no unemployment.

Plain horse sense, of course, would say that the Swedish economic miracle should never have happened. This may help to

explain why so many official and semi-official missions have visited Sweden in the past few years to try and find out what makes it tick. A nation is neither more nor less than its people, and to understand a nation we must know something of its people and their history. For over a thousand years Sweden has been Europe's "other island," separated from the West by the sea and, until 300 years ago, without a permanent western coast or

Orthodox

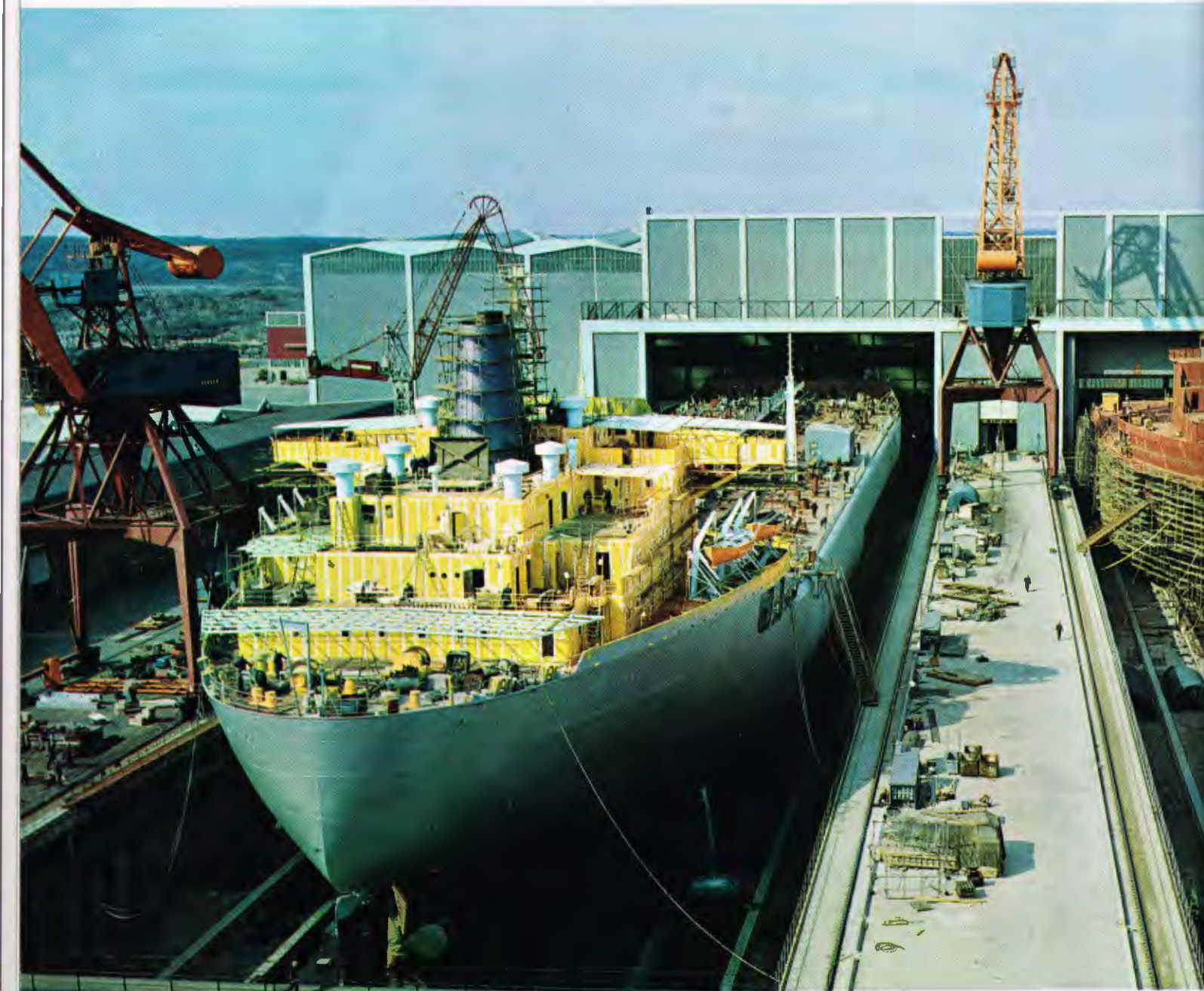
Norman McKenna

western port. It comes as no surprise, therefore, that for much of her history she has been more preoccupied both politically and economically with Russia, Poland and the Baltic States than with the West. In the thirteenth and fourteenth centuries Visby, on the Baltic island of Gotland, straddling the coveted route to Russia and beyond, became the greatest trading centre of northern Europe. The city wall, and many

ancient and magnificent medieval churches and houses, still recall its vanished glory.

Despite this earlier preoccupation with her Baltic neighbours, Sweden today is as vitally concerned with West European affairs and as heavily involved in them as Britain. With Britain she is a member of EFTA and takes it seriously. Like Britain, she lives by her foreign trade and is therefore as anxious as any country to see an end to the discrimi-

ination that now divides the countries of the European Economic Community and those in EFTA. And although a traditional policy of non-involvement in her foreign relations has kept her out of NATO, no country has been more active, relative to its size, in supporting world organisations or in giving aid to less fortunate countries. This profound change in the orientation of Sweden's interests, essentially within a span



Kebnekaise (6,965 ft.) is Sweden's highest mountain. It lies north of the Arctic Circle in Swedish Lapland. Left: Götawerken, one of Europe's most advanced shipyards at Arendal, Gothenburg. Last year Sweden did 10% of world shipbuilding

years. Following the decision by ICI, taken six years ago, to develop its stake in the European market, a new company, Svenska ICI, was formed in 1963 to provide a base for the expansion of ICI's activities in Sweden. Gothenburg was chosen as headquarters because it was more central, in relation to the principal industries ICI serves than any other major city. As part of ICI (Europa) today, the new company and its sister company, ICI Fiber AB, formerly BNS's Swedish company, are now responsible for the sales and marketing of all ICI's major products except pharmaceuticals and the main plastic raw materials. The latter continue to be handled by Rising & Strand, and ICI's pharmaceutical interests are being developed separately through a joint company, AB Scanmeda. This has been established with the former agents AB Meda, to provide the specialist service which must be given to doctors and hospitals for Pharmaceutical Division's new and powerful drugs. Already the tangible benefits from selling through one local organisation to a particular industry, and even more to a particular customer, are being felt.

At the same time as these steps have been taken to consolidate the selling organisation, ICI has taken a 30 per cent share holding in Skandinaviska Aerosol, the largest single aerosol packaging company and our largest customer, in Scandinavia, for the 'Arcton'

range of propellants. A majority interest in AB Silketvinneriet, a company with facilities for bulking, throwing and plying filament yarns, has also been acquired.

There is no doubt that we can look forward with confidence to greatly increased opportunities for developing ICI's interests in Sweden. Although the country's economy is continuing to expand steadily, the process of industrialisation has very much further to go and there is still a lot of steam in the boiler. But because there is an acute shortage of labour, which is being only partly mitigated by immigration, some of the older-established industries, particularly textiles and forest products, are being radically overhauled. Concentration and rationalisation into large units is being forced upon them, and processing operations which are large users of labour are being scrapped. If Sweden is to maintain her present position in world living standards, she must concentrate still more of her effort on those industries where ingenuity, skill and high productivity can keep her in the lead.

For ICI this spells an increasing market for almost all its more sophisticated products, foremost among them perhaps the plastic raw materials. Sweden's consumption per head of polythene is already higher than that in the United States—but with synthetic fibres (increasingly for industrial uses) and the newer chemicals not very far behind.

Sweden is dedicated to the principles of free trade, and it is on an expanding world trade and the opportunities this presents for her to exploit her skills and reputation for quality products that her very livelihood depends. She does not coddle her own industries with high tariffs, and restrictive practices, wherever they occur, are given no chance to take root. This has made her one of the most competitive markets in the world. She can only sell to others by the quality and the competitiveness of the goods she produces. ICI is selling to her on the same basis which is the orthodox Swedish approach to business.

Today ICI has significant advantages over its major world competitors—for many of its products a customs advantage, for all of them a psychological one—through Britain's and Sweden's common interests in EFTA. But these advantages will not last. In one way or another the present anachronistic trading cleavage in Europe will be resolved. The fact that time is not on our side provides an incentive for both the United Kingdom and the Swedish sides of our operation to continue to seize the opportunities now open in that country whenever and wherever they present themselves. In this way there is good hope that the Company's already considerable success in this market can match the enviable situation which Sweden has made for herself in the world.

Opposite page: New factory at Hultsfred of Scandnaviska Aerosol AB., Scandinavia's largest aerosol-filling company and ICI's biggest customer in Scandinavia for 'Arcton' propellants. ICI has a 30 per cent shareholding in this concern

Bottom left: The old quarter of Gothenburg. Headquarters of Svenska ICI and ICI Fiber AB. are here
Below: Stig Lindberg with a selection of his industrial designs, many of which have been seen in British shops

Bottom right: Visby, on the Baltic island of Gotland, was in medieval times the greatest trading centre of Northern Europe straddling the sea route to Russia. Old houses and churches, like the one below, recall its former greatness



Golf balls receive four coats of paint in this mechanized spray operation that handles 140 balls a minute at the Toronto factory of Campbell Manufacturing Co. Ltd. This company, one of Canada's leading manufacturers of golf equipment, was acquired last year by Canadian Industries Ltd., ICI's Canadian subsidiary. Products include balls and clubs endorsed by two of the world's leading golfers, Arnold Palmer and Gary Player, and the company exports to 27 countries.

